occur in the succession. Mr. A. Irving dealt with the chemical and geological characters of the Bagshot sands, their bedding, and fossils, and argued that they must have been deposited in an estuary opening on the sea.

Chief amongst the palæontological papers must be placed Prof. Marsh's restorations and descriptions of the Ceratopsidæ, of the skulls of which he exhibited life-size diagrams, some more than six feet in length. Prof. Seeley gave a description of the mural arch in the Ichthyosauria from Liassic and Oolitic specimens. Mr. Smith Woodward exhibited five examples and plates of fishes from the Hawkesbury series, and, on behalf of Prof. Anton Fritsch, plates and descriptions of Palæozoic Elasmobranchs, while Dr. P. H. Carpenter, dealing with the morphology of the Cystidea, compared them with the Crinoids and Blastoids, and suggested that in forms without a genital pore the anal pyramid may have subserved generative functions, while in two forms a fourth opening may possibly have been nephridial in function.

With the exception of local papers, petrology was thinly represented. Mr. Hunt read a paper on the saline inclusions of the Dartmoor granite, and favoured the idea of their derivation from the sea; and Mr. Brindley gave a useful account of the principal marbles of the Mediterranean—a pendant to Sir Lambert Playfair's address to the Geographical Section. Other foreign papers were, one on the geology of Nicaragua, and a second on human footprints in recent volcanic mud in the same area, by Dr. J. Crawford, an account of the minerals of New South Wales, including coal, gold, silver, tin, copper, antimony, iron, diamonds, and ornamental stones, by Mr. C. S. Wilkinson, and a paper on the seismic origin of the "Barisál Guns" of the Gangetic delta, by Mr. T. La Touche.

There only remain to be mentioned, Dr. Tempest Anderson's photographs and descriptions of landslips and volcanoes in Iceland; Mr. Logan Lobley's paper containing an estimate of the gold scattered through the pyrites in the clays and chalk of south-east England; Mr. Hart on volcanic paroxysms; and a paper by Mr. Browne on historical evidences for changes of sea and land levels in the south-east of England.

MECHANICS AT THE BRITISH ASSOCIATION.

THERE was a full programme in Section G at the recent meeting of the British Association at Leeds. It is questionable, however, whether quantity was not obtained somewhat at the expense of quality. We are aware of the great difficulty there is in regulating the supply of papers in the Mechanical Section, and so long as the present mode of procedure remains in force the difficulty will also remain. There should be a limit to the number of papers to be read, and there should be a fixed day on which contributions might be sent in. The day being fixed, it should be adhered to with absolute severity—not the names of all the professors and all the science-knights should suffice to break the law. The papers that were deemed most worthy would be accepted, whilst those with less merit would be returned with thanks. This would create a competition amongst contributors, and would-be contributors, which would, we are sure, have a most healthy influence on the proceedings of the Section. We do not make these remarks simply by the way; the fact is, the proceedings in Section G are becoming of a scrambling and hap-hazard character. It is not long since that one gentleman in this Section read a paper he had previously read before the Institution of Naval Architects. He did not take the matter and re-dress it, but calmly read from the proceedings of the latter society, word for word. This year we have had a great deal of matter that has already appeared in some of the technical journals. The discussions on the papers were, as a natural consequence, generally of a poor description. There was so much to get through that the president was obliged to be constantly hurrying, and any one who was not of the elect was treated with somewhat scant ceremony. As no one knew what the papers were to be about, the most that could be said as a rule was of a superficial and commonplace character, some of the most noted exponents of this school of discussion being especially to the fore. It is very certain that, unless Section G sets its house in order, the mechanical science of the British Association will become a byeword amongst engineers. When one contrasts the scant and listless audience at Leeds last week with that at a meeting of the Institution of Civil Engineers, or of the Institution of Naval Architects—the meetings of the latter are more akin to those of the British Association—one cannot but feel that there is need for very radical reform. The two chief reforms we would suggest would be that a limit should be put to the number of contributions, and that abstracts should be printed in good time and copies be previously sent to members and associates on application. The former would raise the quality of the papers—because that which every one can get no one values—whilst the latter would raise the quality of the discussions.

There were thirty items on the five days' programme in Section G, namely twenty-seven papers, two reports of Committees, and the Presidential address of Captain Noble. The proceedings commenced at noon of Thursday the 4th inst., a later hour than usual being selected in order that the members of the mechanical section might hear the Presidential address of Dr. Glaisher in the Mathematical and Physical Section. Captain Noble's address we have already printed in full.

The first paper on the list was by Mr. J. F. Green, of Blackwall, and was entitled "Steam Life-Boats." The historic firm at Blackwall Yard have at last succeeded in solving a problem, oft attempted but never before with success, and have produced a steam life-boat which has given satisfaction to the Royal National Life-boat Institution. The vessel is driven by the reaction of a stream from a turbine, a mode of propulsion which certainly finds a useful position for life-boat work, whatever may be its shortcomings in the matter of mechanical efficiency. The boat has been placed on the Harwich station, and gives, we think, every promise of success. The great question is undoubtedly that of expense, first cost of boat and cost of upkeep. That however is a matter to be settled by Messrs. Green and the Life-boat Institution. We would suggest that this boat might be improved by the use of liquid fuel on the principle adopted by Messrs. Doxford, of Sunderland, and applied by them to the big torpedo boat they have recently constructed. We know the danger of including too many experiments in one vessel, but now that Messrs. Green have proved their design so far they might venture a step further; and we can speak as to the practicability of the liquid fuel system in question.

"The Victoria Torpedo" was the title of the next paper, which was contributed by Mr. G. R. Murphy. This weapon, which, like all other torpedoes, is to beat everything that has gone before in murderous potentiality, has not yet assumed tangible shape, but the form it is to take when completed was fully illustrated and described in the columns of one of our technical contemporaries a few weeks ago. A paper on aluminium bronze, which calls for no special comment, came next, and was followed by one of the most interesting contributions to the section, in the shape of a paper by Prof. Barr and Dr. Stroud, on new telemeters and range finders. Without illustrations we could not give a fair description of the ingenious instruments, in which the authors of the paper have applied certain mathematical laws to judging of distance, and we will therefore leave the subject for a future occasion.

On the following day, Friday, the 5th inst., the proceedings commenced with the reading of two reports of Committees, namely the Estuaries Committee, and the Graphic Methods Committee. Both these were very brief, and consisted in substance in saying that the work was still progressing. A paper on the manufacture of netting from sheet metal dealt with a process already described in a technical journal. A number of short slits are made in a sheet of metal by a special shearing press, and the slits are opened out so as to form a number of diamond-shaped holes. The invention is ingenious, and the "netting" possesses the great merit of rigidity. Cable tramways next occupied the attention of the Section; Mr. W. N. Colam reading a paper in which he described certain devices which he has devised in connection with this means of dealing with passenger traffic. The "Serve" tube and the simplex brake were the subjects of two papers by Mr. W. B. Marshall. The former is for boiler tubes, and has ribs of metal running the whole length of the interior of the tube. These ribs extend down into the stream of hot gases, and so absorb much of the heat that would otherwise go to the uptake. Of course the heating surface of the tube is much increased, and this is effective heating surface, as the resistance to absorption is greatest at the surface. The Thorne Type Composing Machine, which next came before the Section, appeared to us as an old friend which we think made its *début* in Europe at the American Exhibition, if not before, and was duly illustrated and described in the technical journals of the day. The Bénier hot air motor had

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also previously made its appearance in an engineering publication, but the contribution of Mr. Vernon on this subject was taken as read.

On Saturday, the 8th inst., only three papers were taken. Prof. A. Lupton read a contribution on the pneumatic distribution of power; in the course of which he gave some interesting details of the important system which is now working at Birmingham. This paper gave rise to a good discussion, in the course of which the author was sharply taken to task for the efficiency he claimed for the system. It should be pointed out, however, that Mr. Lupton did not speak of "efficiency" as looked at from a scientific standpoint, but from a commercial point of view, which enabled him to take credit for certain waste heat, not obtained from the power installation, which would otherwise be thrown away. This was plainly stated in the paper. Mr. F. G. M. Stoney's paper on the construction of sluices for rivers, &c., was next read. The subject was of course well treated by the author, and the paper was acceptable; but there was little novel in it, except the reference to the new tilting sluices which are to be put up in connection with the new lock at Richmond. Mr. Cope Whitehouse's paper on the Raiyan reservoir was listened to by a thin audience, the preparation for the afternoon's excursions calling the majority away.

Monday in Section G is now given over to applied electricity, and there is invariably a large influx of the more abstract A's into the section. The Leeds meeting was no exception to this rule, and when Sir William Thomson opened the proceedings by reading his paper the People's Hall, which the section occupied, had quite a crowded appearance. The subject which first occupied Sir William's attention was the new electric meter which he has recently brought out. This apparatus is yet in the experimental stage. Perhaps Sir William will be able to do something towards cheapening the design. An example of the meter was shown in operation on the platform. In the discussion which followed, Prof. Fleming made some pertinent remarks on the effect of rough and smooth surfaces. The multicellular voltmeter and the engine-room voltmeter described by the author had previously been brought before the public through the medium of technical literature. A new form of voltapile, also described, was an instrument which was intended for standardizing operations. Mr. Gisbert Kapp described the Lineff system of electric traction, by means of which a partially buried conductor can be used with safety to man and beast. Messrs. Lawrence and Harries next read a paper on alternate *v.* continuous currents in relation to the human body. No doubt at times the effect of electrical currents on the human body possesses a very intense interest for engineers, nevertheless the paper was hardly suitable for the Mechanical Section. It is well, however, that engineers should remember, as was stated in the paper, that not voltage only, but current strength is the important factor in estimating the danger from accidental contact. In the discussion which followed, the late American execution naturally occupied a prominent place. Mr. Wilson Hartnell brought the meeting back to a more mechanical complexion by reading a paper on electric lighting and fire insurance rules, illustrating his remarks by practical examples. He succeeded pretty conclusively in showing that the fire insurance companies want instruction in electrical matters, and, we think, at the same time, he surprised some of those present, who certainly have had considerable experience in electrical matters, by the result of his experiments. The paper was eminently practical and worthy of study by engineers. The last paper on the list for the day was by Mr. W. J. S. Barber Starkey on secondary batteries, in which the author described his system of adding carbonate of soda to secondary batteries. The subject is not new.

Tuesday, the 9th inst., was the last day on which Section G met. Mr. Preece first occupied about five minutes in reading a short contribution on submarine cables for long distance telephony. Mr. F. Higgins next exhibited the "Column Printing Machine," after which Mr. Arthur Greenwood read his paper on heavy lathes. Mr. W. Bayley Marshall followed with a suggestive paper on factors of safety, in which he gave the results of a large number of tests of iron and steel extending over a period of five or six years. The conclusion he had come to was that in roof and bridge work elastic limit, and not ultimate tensile strength, should be the important factor, but in the discussion that followed, which was the best discussion during the meeting, the pertinent question was raised as to what "elastic limit" is. A paper by Mr. J. H. Wicksteed on the measurement of elongation in test samples was also well discussed. A paper by Mr. A. Mallock, on the measurement of strains, in which the author described an instrument he had devised for the purpose, and an exhibition by Prof. Barr of a mechanism for giving vertical motion to a camera, brought the business of the Section to a close.

SCIENTIFIC SERIALS.

American Journal of Science, September.—Rocky mountain protaxis and the post-cretaceous mountain-making along its course, by J. D. Dana.—The magneto-optical generation of electricity, by Dr. Sheldon. It is well known that, by using proper conditions, a beam of plane polarized light may be rotated by an electromagnet, and that a reversal of the current causes the plane to be rotated in the opposite direction. A rapidly alternating current thus produces a rapid swinging to and fro of the plane of light. The author has conducted the converse experiment, and by oscillating the plane of polarization through 90° about 300 times per second, has produced an alternating current.—Contributions to mineralogy, No. 49, by F. A. Genth, with crystallographic notes by S. L. Penfield. The results are given of the examination of some specimens of ferric sulphate from Mina de la Compania, Chili.—Chalcopyrite crystals from the French Creek Iron Mines, St. Peter, Chester County, Pa., by S. L. Penfield.—Koninckina and related genera, by Dr. Charles E. Beecher.—The effect of pressure on the electrical conductivity of liquids, by C. Barus. It is shown that, both in the case of mercury and a concentrated solution of zinc sulphate, the effect of isothermal compression is a decrement of resistance nearly proportional to pressure, and from this fact the deduction is made that the immediate effect of rise of temperature is a decrement of specific resistance.—Notice of two new iron meteorites from Hamilton County, Texas, and Puquois, Chili, by Edwin E. Howell. Analyses of the two meteorites are given.—The Cretaceous of Manitoba, by J. B. Tyrrell.—On mordenite, by Louis V. Pirsson.—Geology of Mon Louis Island, Mobile Bay, by Daniel W. Langdon, Jun.—On Leptænisca, a new genus of Brachiopod from the Lower Helderberg group, by Dr. Charles E. Beecher.—North American species of Strophalosia, by the same author.—Notes on the microscopic structure of oolite, with analyses, by Erwin H. Barbour and Joseph Torrey, Jun.

L'Anthropologie, sous la direction de MM. Cartailhac, Hamy, et Topinard, tome i., Nos. 3 and 4 (Paris, 1890).—The exotic races at the Exhibition in Paris, 1889, by MM. Deniker and Laloy. In this report the authors give the general results of the anthropometric determinations they obtained from their examination of 145 individuals belonging to the most different races, some of which had not previously been made the subject of scientific inquiry. The value of their remarks on the various Senegalese and other South African negroes is enhanced by an admirable series of portraits, copied from spirited photographs by Prince Roland Bonaparte. From the observations of the authors, it appears that the negroes of West Africa may be divided into three or four groups, differing in physical characters. In fact, crispness of the hair, and a more or less dark coloration of the skin, seem to be the only characteristics common to all. The negro races generally are tall, have flat noses, and are of a dolichocephalous type, each group presenting, however, certain features which distinguish them from the remainder. The two leading varieties are separated by tribes which are small in stature, with a very hairy skin, and are of a marked brachycephalic type. This intermediate group is spread across Africa from the extreme east to the west, in about 2° S. and 3° N. of the equator, and it is among these peoples that the true pygmy tribes are found, which under the name of Akkas or Tiki-Tiki of the Nile, Batus of the Congo, Akoas of the Ogowe, have become known to us through Stanley and other recent explorers. According to Emin Pasha, to whom we are indebted for the few particulars that we know regarding their physical character, the mean height of these so-called negrilloes is 1·36 m., and their mean cephalic index 79; brachycephalism being a marked character in all the pygmy tribes. Very complete tables are given by the authors.—New explorations at Solutré, by M. A. Arcelin. Palæontologists will welcome the report here given of the various explorations that have been in progress at Solutré since these important deposits were first made the subject of scientific inquiry in 1866. The extent of the beds, which at some points are fully

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